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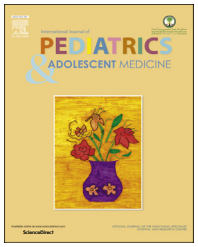

ORIGINAL ARTICLE

Incidence and distribution of cancers in adolescents and young adults: Single institution experience in Lebanon

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KEYWORDS
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Abstract *Background and objectives:* Cancers of adolescents and young adults are relatively rare and have specific features that range from the types and locations of these tumors to their specific medical, physical, psychological and social needs.
Materials and methods: A retrospective descriptive study on cancer patients aged between 15 and 25 years at Hotel Dieu de France, Saint Joseph University Hospital in Beirut, Lebanon from 2007 to 2011 was conducted to study the incidence and distribution of cancers.
Results: We identified 205 adolescents and young adults with cancer in Hôtel Dieu de France, Saint Joseph University Hospital in Beirut, from 2007 to 2011, which represent 2.9% of all cancers diagnosed in this hospital. Lymphomas (32%), bone tumors (12%), central nervous system (CNS) tumors (13%), leukemia (9%), thyroid cancers (9%), ovarian (5%) and testicular tumors (3%) accounted for more than 80% of all cancers. Thyroid cancers represented 17% of all female cancers in this patient category compared to 1% in males, while the CNS and bone cancer had a higher incidence in males.
Conclusions: Despite the low incidence of cancers in adolescents and young adults, it is essential to obtain more multicentric national and regional comparative data, which can help to elucidate the incidence and distribution of these cancers.

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1. Introduction

Cancers of adolescents and young adults have specific features that range from the types and locations of these tumors to their specific medical, physical, psychological and social needs. The majority of these cancers occurred without a predisposing cause and were linked to carcinogens or familial syndromes in less than 5% of cases [1].

Older adolescents and young adults with cancer have benefited less from therapeutic advances and studies compared to older or younger oncological patients [2].

Cancers of adolescents and young adults are relatively infrequent. Their incidence in France is estimated at 700 new cases per year in the 15- to 19-year- old age group and 1000 new cases per year in the 20- to 24-year-old age group, thereby representing 0.5% of all cancers [3].

Cancers of adolescents and young adults between 15- and 25-year-olds represent 2% of all cancers in the United States [1], a percentage that is comparable to that found in the Lebanese population where 2.16% (204/9423) of cancer patients in 2008 are included in this age group [4].

Finally, the distribution of different types of cancers changes from 15- to 25-year-olds, where most common cancers between 15- and 19-year-olds are different from the cancers prevalent between 20- and 25-year-olds.

2. Materials and methods

A retrospective descriptive study was performed on cancer patients aged between 15 and 25 years old at Hotel Dieu de France (HDF), University Hospital of Saint Joseph University (USJ) in Beirut, Lebanon from 2007 to 2011 to study the incidence and distribution of cancers according to the type, location, histology and sex of patients. The data were collected from the pathology laboratory of HDF and were analyzed using SPSS version 17.0.

3. Results

In this study, 205 adolescents and young adults with cancer were identified in HDF/USJ in Beirut from 2007 to 2011, representing 2.9% (205/7068) of all cancers diagnosed in this hospital during this period. Patients were almost equally divided between the two sexes (49.5% males and 50.5% females).

Lymphomas, central nervous system (CNS) tumors, bone and soft tissue tumors, leukemia, thyroid cancers, ovarian and testicular tumors accounted for more than 85% of all cancers (Fig. 1).

Lymphomas (32% of all cancers of the 15- to 25-year-old age group) were of the Hodgkin type in two-thirds of the cases (66%), and one-third of the cases were of the non-Hodgkin type (34%), with 55% being females and 45% being males.

Concerning bone tumors (12% of all cancers in the 15- to 25-year-old age group), Ewing's sarcomas were the most frequent type (43%), followed by osteosarcomas (26%) and chondrosarcomas (9%). Two-thirds of these tumors occurred in males, and one-third occurred in females (Fig. 2).

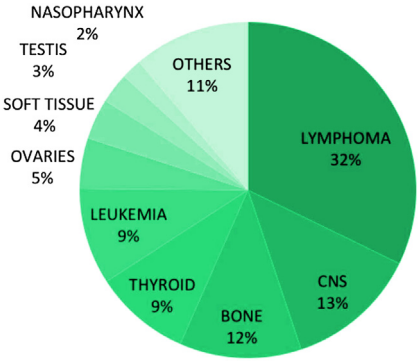

Figure 1 Incidence of different cancers in adolescents and young adults.

CNS tumors accounted for 13% of all cancers in the 15- to 25-year-old age group (70% males, 30% females). The most common histological types were medulloblastomas (23%), glial tumors (19%), pilocytic astrocytomas (19%), oligodendrogliomas (12%) and ependymomas (8%) (Fig. 3).

Leukemias and thyroid tumors represent 9% of all cancers in the 15- to 25-year-old age group. In addition, 58% of leukemias were ALL, 37% were AML and 5% were biphenotypical.

For thyroid cancers, 74% were of the papillary type, 21% of the follicular type and 5% of the medullary type, which occurred in more than 95% of female cases.

Thyroid cancers represented 17% of all female cancers in this patient category compared to 1% in males, while CNS and bone cancer had a higher incidence in males compared to their incidence in females (Fig. 4a and b)

Two cases of breast cancer were reported among young females aged 24 and 25 years old.

Lymphomas and bone tumors are more common in adolescents aged between 15 and 19 years old compared to thyroid tumors, tumors of the CNS, testicular and ovarian tumors, which were more prevalent in young adults between 20 and 25 years old (Fig. 5a—b).

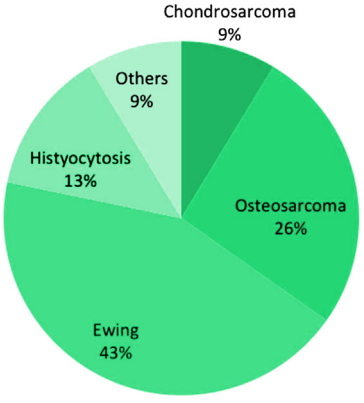

Figure 2 Cancers of bone in adolescents and young adults.

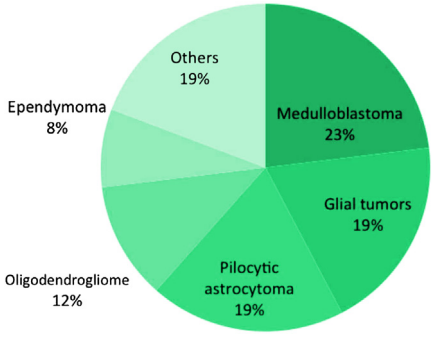

Figure 3 CNS cancers in adolescents and young adults.

4. Discussion

HDF is a leading tertiary care provider in Lebanon; it is one of the oldest medical centers and among the main institutions offering oncology care in Lebanon. More than 15% (1455/9423) of cancers in Lebanon are diagnosed and treated in HDF [4].

The number of adolescents and young adults is dramatically decreased in developed countries, while they represented more than 20%–25% of the population in developing countries. The Lebanese population is notably young; adolescents and young adults represent more than 20.5% of the population [4].

The percentage of cancers among adolescents and young adults compared to all cancers in the general population is nearly similar in Lebanon, the United States and France. However, many features distinguish the Lebanese population from other populations.

The most common cancers in this age group in Lebanon are similar to those in France or the United States, except for melanomas, which represent 15% of cancers in adolescents and adults in Western countries. However, melanomas are nearly nonexistent in Lebanon, which is most likely related to the Lebanese darker skin color [1].

However, a difference in the order of the frequency of tumors was observed, namely, the greater prevalence of bone and CNS tumors in Lebanon, while testicular and ovarian tumors are more common in the United States [5]. This distribution of germinal tumors is consistent with the North-South gradient theory in occidental Europe and West-

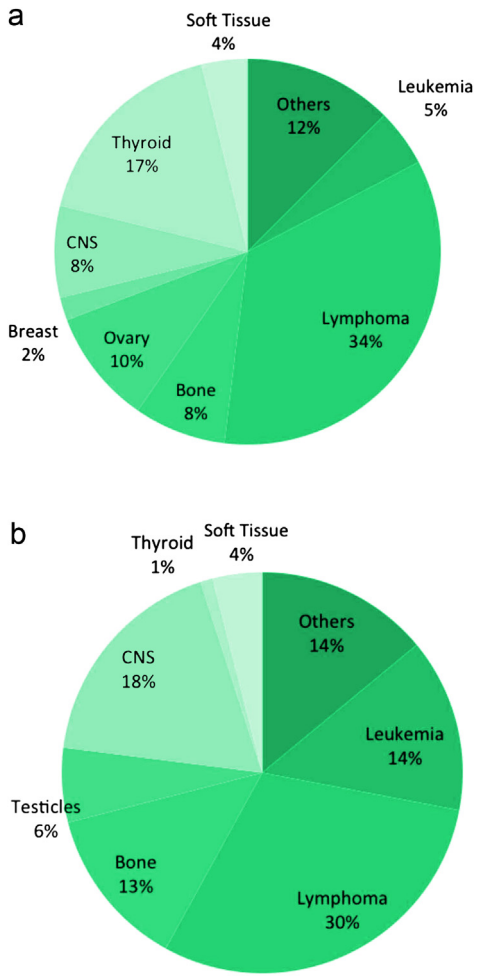

Figure 4 a. Incidence of cancers in adolescents and young adults (females). b: Incidence of cancers in adolescents and young adults (males).

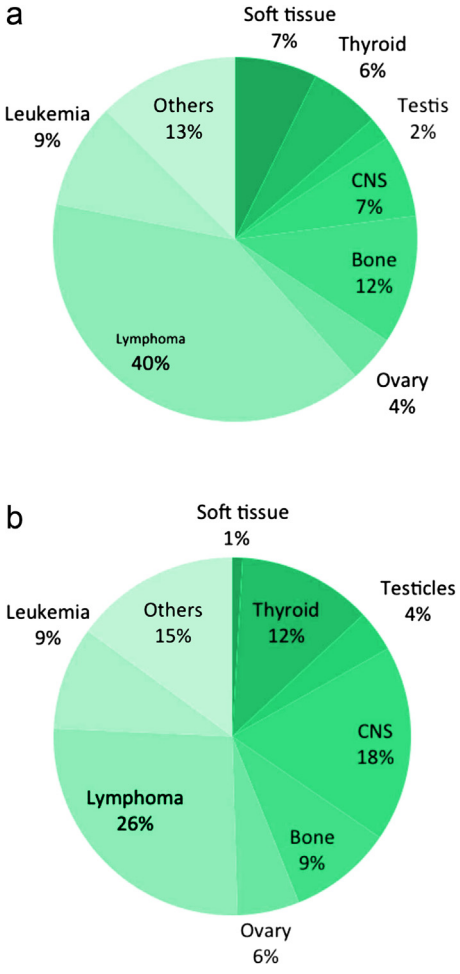

Figure 5 a. Incidence of cancers in adolescents. b. Incidence of cancers in young adults.

East gradient theory in the region of the Baltic Sea. This difference was attributed to genetic, hormonal and environmental factors [6].

The higher incidence of bone and CNS tumors in our hospital can be attributed to more referrals to the orthopedic and neurosurgery department of oncology patients on the national and regional level due to the well-established multidisciplinary programs in these fields.

In our study, lymphomas represent one-third of all cancers in this category (32%) compared to the results of the National Cancer Registry of 2008, where 31.8% (65/204) of cancer among this population were lymphomas [4]. Hodgkin lymphoma (HL) represents two-thirds of lymphomas and one-third of non-Hodgkin lymphoma (NHL). Thus, HL represents 22% of all cancers in this group of patients. There is a higher incidence of lymphomas in Lebanon (32%) compared to the Unites States (22%); the percentage of HL in Lebanon compared to all lymphomas is similar to that in France (two-thirds) [7], but higher compared to the United States (50%), a result which can be explained by the Mediterranean distribution of lymphomas, which is higher than the American and Nordic incidence.

Two cases of breast cancers were found in our young population, which is a result that was surprising but may be explained by the mean age of females with breast cancer and was 10 years lower in Lebanon compared to Western countries [8].

Adolescents and young adults represent a part of the active population and their health problems can have many consequences on the health care strategy of a country.

Many parameters characterize the cancers among adolescents and young adults: the unique distribution of their cancer type, favorable prognosis and lack of progress in survival improvement relative to all other ages. This category of patients is likely to have had a delay in diagnosis due to inadequate health insurance and consequently presented with a more advanced stage of disease and demonstrated less benefit from therapeutic advances than did younger or older populations.

5. Conclusions

Despite the low incidence of cancers in adolescents and young adults, it is essential to obtain multicentric, national and regional comparative data, which can help to elucidate the incidence and distribution of these cancers, and to investigate the detection and prevention of these cancers, given the potentially crucial place in society occupied by this age group.

Conflict of interest

The authors declare that they have no conflict of interest.

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